ZOO 4377L - VERTEBRATE MORPHOLOGY LAB

Lab 13: Urogenital System

Name: _____ SSN: _____

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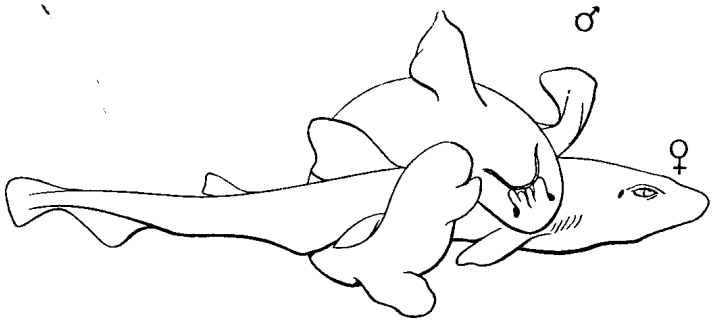
Next Week's Assignment: None (Free at last!)

Preparation: Walker & Homberger - Chapter 12 (*Excretory and Reproductive Systems*): pp. 395-411, 413-430; read the small print and skim the large print sections.



Background

The urinary system and the reproductive system are usually grouped by anatomists into the urogenital system. Although these systems may seem functionally independent, they are intimately linked in terms of both their development (ontogeny) and their evolution (phylogeny). In adults of nearly all craniates some structures (notably various ducts) continue to be shared by both systems. Indeed, only female primates (including humans) have achieved virtually complete separation and independence of urinary and reproductive systems.

Ancestrally, the craniate kidney extended over most of the body segments of the visceral cavity. Such a kidney is called a **HOLONEPHROS.** No living adult craniate retains such a kidney, but the embryos of some pass through a holonephric stage. In adult craniates there has been a progressive reduction and localization of the body segments contributing to the functional kidney. In some teleost fish, only the anteriormost body segments of the ancestral holonephros form the adult kidney. This is called a **PRONEPHROS.** In sharks and most amphibians, the pronephric region disappears in the adult, but the remainder of the ancestral kidney develops. This kidney is called the **OPISTHONEPHROS,** an example of which you are dissecting today. The anterior part of the shark opisthonephros no longer functions in urine function and in males is devoted to sperm storage and transport. It is homologous to the amniote **EPIDIDYMIS.** In amniotes, the functional kidney has become even further restricted posteriorly and is more compact. It is called the **METANEPHROS,** as seen in the cat. The anterior part of the opisthonephric kidney has been lost, except for the part which contributes to the epididymis in males. The metanephros compacts many functional nephrons into a small space; the correspondence between nephric units to body segments has been lost.

Although the cat metanephros does not look very much like the shark opisthonephros, they have similar patterns of early development. Also note that both lie against the dorsal body wall in a position termed **RETROPERITONEAL -** that is, *behind* the peritoneal lining of the coelom (body cavity). Recall that most organs of the digestive system *protrude into* the coelom, and thus are **INTRAPERITONEAL**.

Today's Lab

Part I: Dissection of Shark and Cat

Work in pairs. Perhaps the best approach is for one partner to dissect the shark, the other to dissect the cat. Then give each other a tour of your dissection. Note the sex of your animal. BE SURE TO EXAMINE SPECIMENS OF BOTH SEXES FOR BOTH SPECIES!

Try to identify as man of the following structures as posssible:

Shark

Kidneys & their ducts (p. 405; Fig. 12-7)

- **retroperitoneal**
- **opisthonephric kidneys**
- **archinephric ducts**
- **cloaca**

Male urogenital system (pp. 405-7; Fig. 12-7**)**

- **testes**
- ductuli efferentes (efferent ductules**)**
- **Leydig's gland**
- **seminal vesicle**
- **sperm sac**
- **urogenital sinus**
- **urogenital papilla**

Female urogenital system (pp. 408-9; Fig. 12-7**)**

- **ovaries**
- **oviducts**
- **ostium tubae**
- **nidamental gland**
- **uterus**
- **urinary papilla**

Cat

Excretory system (pp. 414-417; Figs. 12-12, 12-13)

- **metanephric kidney**
- **renal artery**
- **renal vein**
- **ureter**
- **bladder**
- **urethra**
- renal sinus
- **renal pelvis**
- **cortex**
- **medulla**

Male urogenital system (pp. 417-24; Figs. 12-14, 12-15). The instructor will show you how to open the scrotum.

- **scrotum**
- **testis**
- **epididymis**
- **ductus deferens**
- **inguinal canal** and **spermatic cord**

Female urogenital system (pp. 424-28; Figs. 12-18, 12-19, 12-20). The instructor will show you how to split the os-coxa to open up the vagina.

ovaries
uterine tube
ostium tubae
horn of uterus
body of uterus
vagina
vaginal vestibule

Part II: Pregnant Shark and/or Pregnant Cat Demonstrations

A derived feature of many sharks, including *Squalus,* is that they give birth to live young (they are **VIVIPAROUS).** The young are retained within the uterine portion of the oviducts where they complete their development with the aid of a large yolk supply. In some species of shark fetal nutrition is provided by the mother directly through a **PLACENTA.** Placentas have evolved a number of times among craniates. A placenta consists of an *apposition of fetal and parental tissues for purposes of physiological exchange.* The structure of placentas range from simple adhesion of fetal and parental tissues, to interdigitation, to actual fusion. The dogfish shark is characterized by a **YOLK SAC PLACENTA.**

All mammals, except monotremes, are viviparous. Eutherian mammals are also known as placental mammals owing to their evolution of a particularly complex form of placentation known as the **CHORIO-ALLANTOIC PLACENTA,** with true fetal-maternal fusion of tissue. Even among eutherians, however, the form of the placenta varies. For example, different groups of mammals have a characteristic placental shapes. In carnivores, such as the cat, the placenta is **ZONARY,** that is it forms a girdle around the circumference of the uterus. In anthropoid primates (such as yourself), the placenta is **DISCOID.**

A pregnant shark or cat is provided; open the pleuroperiotoneal or peritoneal cavity to inspect the uteri and embryos.